UNIVERSITY OF ESWATINI

INSTITUTE OF POSTGRADUATE STUDIES

FINAL EXAMINATION, APRIL 2021

MSc. E.R.M.

TITLE OF PAPER: GEOGRAPHIC INFORMATION SYSTEMS

COURSE NUMBER: GEP607

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS:
1. ANSWER ONE QUESTION FROM EACH SECTION
2. IILUSTRATE YOUR ANSWERS WITH EXAMPLES AND CLEARLY DRAWN DIAGRAMS WHERE APPROPRIATE

ALLOCATION OF MARKS: EACH QUESTION CARRIES 50 MARKS

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

GEP607: GEOGRAPHIC INFORMATION SYSTEMS – APRIL 2021

SECTION A: ANSWER ONLY ONE QUESTION

QUESTION 1

The Ministry of Natural Resources and Energy is involved in a drive to increase clean energy generation in the country, a move meant to reduce the country's overreliance on energy from neighbouring countries. As a GIS officer in the ministry, the Principal Secretary has tasked you with identifying sites where photovoltaic solar power plants could potentially be established in the country.

a) Identify the data requirements including the required coverages (i.e., shapefiles or layers) that you would use in your analysis, highlighting the sources of data and cost associated with the acquisition of the data.   (15 marks)

b) Describe in detail how you would go about identifying the potential sites for the photovoltaic solar power plant, including any spatial analysis that you will do on your selected coverages.   (30 marks)

c) Explain the notes that you would develop to accompany the map to assist the Ministry interpret the product.   (5 marks)

(50 Marks)

QUESTION 2

a) Discuss the two (2) key parts of the spectrum that are maximally reflected/scattered by green vegetation?   (15 marks)

b) Define GIS and remote sensing, and discuss the relationship between the two.

(20 marks)

a) Briefly describe the following GIS concepts or terms.

    i)   Buffering   (3 marks)

    ii)   Database   (3 marks)

    iii) Spatial data query   (3 marks)

    iv) Attribute data   (3 marks)

    v)   Overlay   (3 marks)

(50 Marks)

SECTION B: ANSWER ONLY ONE QUESTION

QUESTION 3

World Vision Eswatini is currently involved in a rehabilitation project for degraded rangelands in rural communities in the Middleveld Region. One of the project components is the use of satellite imagery to map land and cover change in the area over the past 20 years. As a remote sensing specialist, the organisation has approached you to solicit advice on how to use remote sensing for this task.

Fully discuss the GIS and remote sensing technique(s) you would recommend to the organisation, with a justification for the selection(s), as well as describe the step-by-step procedure you would advise the organisation to follow in executing the task.

(50 Marks)

QUESTION 4

a) With the aid of diagrams and using examples, discuss the two ways of representing GIS data, and discuss the advantages and disadvantages of each representation.

(30 marks)

b) Discuss and differentiate between pixel- and object-oriented approaches in image classification.   (15 marks)

c) What is the distinction between a discrete map and a continuous map surface?

(5 marks)

(50 Marks)